BLANKOM®

Professional Headend Solutions

Operating instructions

ASI Transmodulator

ASI MPEG RADIO FM-RADIO

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» **ATR 221**
Part N°: 9860.01

...Setting Signals

1. Safety and operating instructions

STOP When assembling, starting-up and adjusting the modules, it is necessary to consider the system specific references in the manual instruction!

⚠ The modules may only be installed and started up by authorized technical personnel!

⚠ When assembling the modules into the receiving points, the adherence of the EMC regulations is to be secured!

⚠ The assembly and wiring have to be done without voltage!

⚠ All active modules may only be operated with the Headend Controller HCB 100 or Bus Extender BEB 100!

⚠ The main voltage and the operating voltage of the modules working by DC have to be in complience to the operating parameters described in the technical datas.

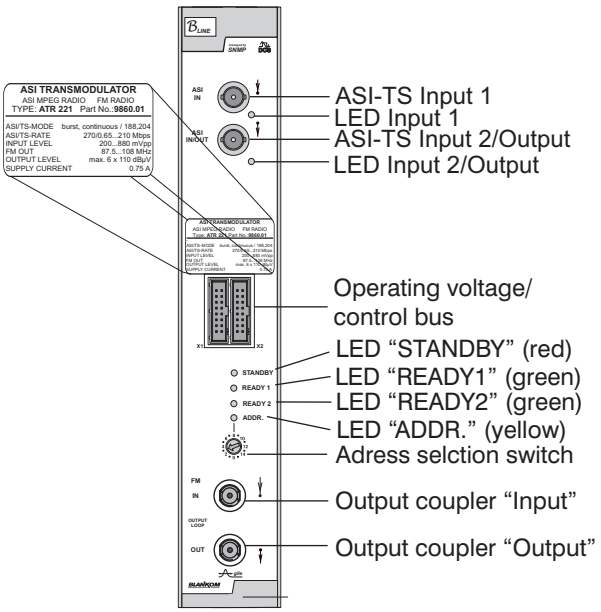
⚠ With all work the defaults of the DIN EN 50083 have to be considered! Especially the safety relevant execution of the DIN EN 50083/1 [3] is necessary!

ATR 221
Part N°: 9860.01

ASI TRANSMODULATOR
ASI MPEG RADIO FM-RADIO

B-LINE

2. Front view



gile DCS managed by SNMP

3. Device variant

ATR 221	9860.01	2 x ASI (TS)	6 x FM-Radio [87,5...108 MHz]

Minimum software requirements for HCB 100:
9650.03: Version 2.34*
9650.04/.05: Version 3.18*

*) Updates: www.blankom.de

4. General

The ATR 221 ASI transmodulator is one component of the B-LINE headend system which has been designed as a complete package for medium-sized distribution networks. The component makes it possible to produce up to 6 radio programmes coded as MPEG2 from two ASI transport streams in the FM range.
All the components are programmed via a single central control unit and thereafter each component will function independently.

5. Function description

The transport streams (TS) passed on by the input section are processed on entering the system. The SI data are extracted and sent on to the control system so that the services to be decoded can be displayed and selected. At the same time, the audio streams to be decoded are filtered out of the transport streams, as are the RDS data, and these are passed to the DSP. The DSP decodes the MPEG data streams which it receives. The RDS data received from the TS processing stage and are sent on, together with the decoded MPEG data streams, to the FPGA of the modulator. 6 complete FM modulators for VHF are implemented in the FPGA. The audio signals are subjected to 19-kHz filtering in these. Next comes the stereo processing: the audio signals are added or subtracted and are modulated to match the 38-kHz carrier; to the audio signal a 19-kHz pilot tone and the RDS data are added. The MPX signal produced in this way is then modulated by FM. The FM signals are combined and passed through a D/A converter. They are then available either via a directional coupler or, simply, direct at the component output port. Each FM channel produced can be configured individually and independently of the others.

6. Adjustments

6.1 Adjustment with the Headend Controller

- Adjustment of the addresses at the Bus Extender BEB 100 and at the modules
- Activation of the programming mode of each module by selecting the line (BEB 100) and the module position (01... 15) at the Headend Controller(HCB 100)
  yellow LED will be lit up til the beginning of the parameter adjustment
- Adjustment of the ATR 221 parameter (see chapter 9)
  green LED is lit up
- After the programming the ATR 221 will be automatically switched into the operating status
  yellow LED lights up briefly / green LED is lit up

6.2 Adjustment with the PC / Laptop

- Condition for the remote programming is an “online - connection” after IP - standard and an ethernet connection at the PC / Laptop
- Adjustment of the line / position addresses at the Bus Extender BEB 100 as well as at the modules
- At the Headend Controller HCB 100 IP - address input (e.g. 192.168.001.001)
- For “direct connection” between a PC and HCB 100 use a crossed patch cable (RJ 45)
- For connection over a deviation use an uncrossed patch cable
- HTML - browser start-up and put in IP - address as target address
- If connected correctly the HTML - control surface at the PC will open up and a blue LED (LINK) at the HCB 100 will be lit up
- All adjustment of the modules are specified at the control surface

The manual instructions of the Headend Controller HCB 100 and the Bus Extender BEB 100 have to be considered!

7. Meaning of LED signals

7.1 LED`s at the ASI sockets

Colour	Status	Meaning of display
Green	permanently illuminated	ASI channel has been configured as input
	flashing	no ASI signal
Yellow	permanently illuminated	ASI channel has been configured as output
	flashing	no ASI signal

7.1 LED`s on front panel

Colour (Name)	Status	Meaning of display
Red (STANDBY)	permanently illuminated	Modul is on standby
	flashing	Modul faulty (Hardware)
Green (READY 1)	permanently illuminated	Modul working, everything ok
	flashing	Error warnings depending on signal: ASI without sync (e.g. when there is no input signal) at least one of the adjusted Audio-PID`s can not be decoded
Green (READY 2)	permanently illuminated	Modul working, everything ok
	flashing	Error warnings depending on signal: ASI without sync (e.g. when there is no input signal) at least one of the adjusted Audio-PID`s can not be decoded
	off	ASI channel 2 has been configured as output
Yellow (ADDR)	illuminated/flashing	Remote control access/Data exchange

8. Programming by Web server *

8.1 Main menu

ASI-AUDIO TRANSMODULATOR, ATR 221
(9860.01 / 00), Address 00 / 00

Description	ASI-UKW Umsetzer						
ASI channel	**1**			**2**			
Status	SYNC			SYNC			
ASI channel 2	Configure						
FM-Channel	**1**	**2**	**3**	**4**	**5**	**6**	
Channel name	radio top40	ffn digital	Inselradio	HIT RADIO FI	planet radio	harmony.fm	
Program settings							
Program listing	only radio programmes / Load						
ASI channel	1	1	1	2	2	2	
Audio PID	353	354	702	1024	1030	1036	dez
FM Output							
RF signal	On	On	On	On	On	On	
Output frequency	92000	92500	93000	93500	94000	94500	kHz
RF level correction	0	0	0	0	0	0	dB
Output attenuation	0						dB
RF output mode	Loop through						
Audio settings							
Audio Mode	Stereo	Stereo	Stereo	Stereo	Stereo	Stereo	
Audio gain	0	0	0	0	0	0	dB
RDS settings							
Data source / mode	Audio-PID	RDS-PID	RDS-PID	RDS-PID	RDS-PID	RDS-PID	
RDS-PID	0	0	0	1025	1031	1037	dez
	Configuration static RDS						
Operating status	On	[On]					
SNMP trap message	On						
	Factory settings	Extended settings	Softwareversion	Status			
	Update	Transmit					
	<<<<	Back	>>>>				

Name Name of module, editable (max. 30 characters)

ASI channel shows the ASI channel (1 or 2) currently in use
Status If there is a channel input (there will always be channel 1, and after configuration channel 2), this shows whether there is **SYNC**hronisation or **noSYNC**hronisation at input port.
If channel 2 has been configured as output, the message will be “Channel has been configured as output”.
ASI channel 2 configuration button for the ASI of channel 2 (see Menu 5)

FM channel display the settings for the FM output channel(s) (1 to 6)
Channel name Name of programme in the relevant FM channel, editable (max. 25 characteres)

Programme settings
Programme list This loads the list of available programmes. The pre-selection is between “all programmes” or “only radio programmes” (see Menu 2).
ASI channel the options are: 1 / 2
Audio-PID Audio PID for the programme, can be freely chosen between 0 and 16383

FM output
RF signal the options are: on or off
Output frequency Adjustment range: 87500...108000 kHz
RF level corretion Adjustment range: +3 …-3 dB 0.5-dB steps (per channel)
Output attenuation Adjustment range: 0 … 31 dB 1-dB steps (modul)
RF output mode Selection: loop / output only

* Further Information can be found in HCB manual

Audio settings

Audio-Mode	Selection: Mono / Mono1 / Mono2 / Stereo / Auto
Audio-Amplification	Adjustment range: +6 ... -10 dB in 0.5 dB steps

RDS settings

Data source / Mode	Selection: RDS-PID / Audio-PID / Static / Off
RDS-PID	freely choosen between 0 … 16383

Redirection to the setting menu: Configuration of the static RDS (see Menu 6)

Operating status	Selection: On, Off, Reset
SNMP-Trap messages	Selection: On, Off

Redirection to the relevant setting menus

Extendet settings	see Menu 3
Factory settings	see Menu 4
Status	see Menu 7
Software versions	see Menu 8

8.2 Load programm list (Menu 2)

ASI-AUDIO TRANSMODULATOR, ATR 221
(9860.01 / 00), Address 00 / 00

Input channel 1		FM-Output channel						Program info			
Audio ID	Program name	1	2	3	4	5	6	Service	Language	RDS	CA
702	Inselradio	○	○	◉	○	○	○	Radio	---		
353	radio top40	◉	○	○	○	○	○	Radio	DEU	*	
354	ffn digital	○	◉	○	○	○	○	Radio	GER		
355	Paloma	○	○	○	○	○	○	Radio	UND		
356	WRN Deutsch	○	○	○	○	○	○	Radio	DEU		
357	PEPPERMINT fm	○	○	○	○	○	○	Radio	GER		
358	ffn Comedy	○	○	○	○	○	○	Radio	GER		
359	Radio Gloria	○	○	○	○	○	○	Radio	---		
1024	HIT RADIO FFH	○	○	○	○	○	○	Radio	DEU		
1030	planet radio	○	○	○	○	○	○	Radio	DEU		
1036	harmony.fm	○	○	○	○	○	○	Radio	DEU		
363	Radio Regenbogen	○	○	○	○	○	○	Radio	UND		
Input channel 2		**FM-Output channel**						**Program info**			
Audio ID	**Program name**	**1**	**2**	**3**	**4**	**5**	**6**	**Service**	**Language**	**RDS**	**CA**
702	Inselradio	○	○	○	○	○	○	Radio	---		
353	radio top40	○	○	○	○	○	○	Radio	DEU	*	
354	ffn digital	○	○	○	○	○	○	Radio	GER		
355	Paloma	○	○	○	○	○	○	Radio	UND		
356	WRN Deutsch	○	○	○	○	○	○	Radio	DEU		
357	PEPPERMINT fm	○	○	○	○	○	○	Radio	GER		
358	ffn Comedy	○	○	○	○	○	○	Radio	GER		
359	Radio Gloria	○	○	○	○	○	○	Radio	---		
1024	HIT RADIO FFH	○	○	○	◉	○	○	Radio	DEU		
1030	planet radio	○	○	○	○	◉	○	Radio	DEU		
1036	harmony.fm	○	○	○	○	○	◉	Radio	DEU		
363	Radio Regenbogen	○	○	○	○	○	○	Radio	UND		
Disable program		**FM-Ausgangskanal**						**Programm Info**			
Audio ID	**Program name**	**1**	**2**	**3**	**4**	**5**	**6**	**Service**	**Language**	**RDS**	**CA**
0	empty	○	○	○	○	○	○				

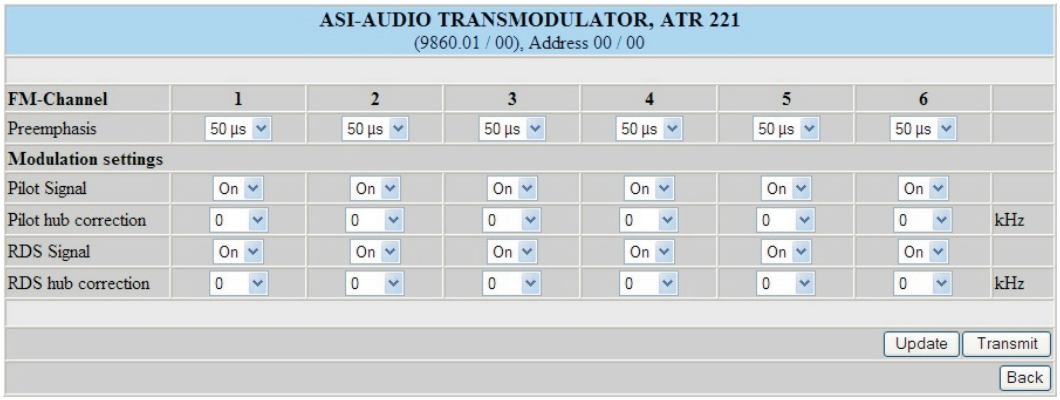
☑ Use program name for static RDS

Update Transmit

Back

This menu contains a list of all services contained in the ASI stream or in both ASI streams. Depending on what has been pre-slected, either all services or radio services only will appear. A service can be selected for each of the 6 FM channels.

8.3 Extended settings (Menu 3)



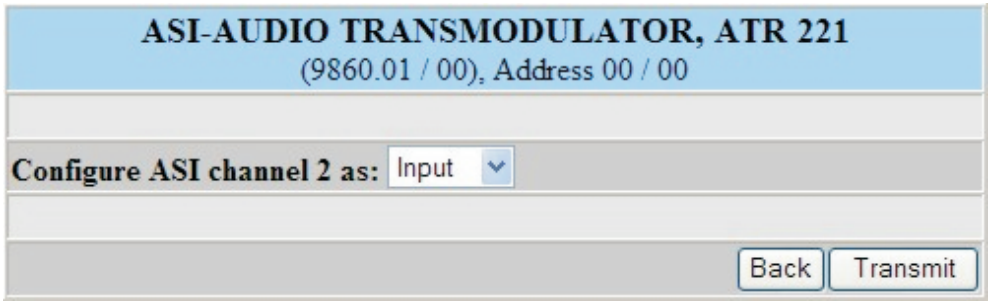
FM channel shows the settings for the FM output channel(s) (1 to 6)
Pre emphasis Selection: 50 µs / 75 µs / Off

Modulation settings
Pilot signal Selection: On / Off
Pilot Hub correction Adjustment range: +2 ... -2 kHz in 0,1-kHz steps
RDS signal Selection: On / Off
RDS Hub correction Adjustment range: +2 ... -2 kHz in 0,1-kHz steps

8.4 Factory settings (Menu 4)

When this menu is called up, all the settings made on the EEPROM will be deleted and replaced by the default settings. The modul will go back to these default values. Once the setting process is over, there will be automatic return to the main menu.

8.5 Configuration of ASI channel 2 (Menu 5)



In this menu, the ASI for channel 2 can be separately configured as an input ASI or as an output that acts as a loop for the input

8.6 Configuration of static RDS (Menu 6)

ASI-AUDIO TRANSMODULATOR, ATR 221
(9860.01 / 00), Address 00 / 00

Configuration static RDS

FM-Channel	1	2	3	4	5	6	
Output frequency	92000	92500	93000	93500	94000	94500	kHz
PI-Code	D313	D363	D303	D391	D3A5	D385	hex
PS-Name	radio to	ffn digi	Inselrad	HIT RADI	planet r	harmony.	
Radio Text							
PTY-Code	ROCK M	POP M	OTHER M	CLASSICS	OTHER M	LIGHT M	
EON Service	Off	Off	Off	Off	Off	Off	
M/S-Code	Music	Music	Music	Music	Music	Music	
DI-Code	1	1	1	1	1	1	dez
TP-Signal	On	On	On	On	On	On	
TA-Signal	Off	Off	Off	Off	Off	Off	
CT-Signal	On	On	On	On	On	On	
RDS time	06:46:53 24.09.2008						

Update Transmit

Back

Configuration of static RDS

FM channel	shows the settings for the FM output channel(s) (1 to 6)
Output frequency	shows the frequencies set for the FM channel (in kHz)
PI code	can be set between 0000 and FFFF (hexadecimally)*
PS name	8 characters of the name of the programme or service being transmitted
Radio text	max. 64 characters, which can be transmitted statically
PTY code	Programme type selected
EON service	Selection: On or Off
M/S code	Selection: music / language
DI code	Decoder identification control code, entered decimally. Default setting: 1 (stereo)
TP signal	Selection: On or Off
TA signal	Selection: On or Off
CT signal	Selection: On or Off
RDS time	shows the time transmitted in the RDS

* The current list of PI codes for German radio broadcasters can be found on the following website:
www.irt.de./de/themengebiete/digitaler-hoerfunk/radio-daten-system-rds.html

8.7 Device status (Menu 7)

ASI-AUDIO TRANSMODULATOR, ATR 221
(9860.01 / 00), Address 00 / 00

ASI channel	1	2	
Status	SYNC	SYNC	
Datarate	33.791872 Mb/s	33.791528 Mb/s	
Workload	2.20 %	3.3 %	
TS-ID	1113	1113	

FM-Channel	1	2	3	4	5	6	
Output frequency	92000	92500	93000	93500	94000	94500	kHz
Audio Status	Layer2 48kHz 192 kbps Frame0= 576 CRC 1 Emph 0 stereo	Layer2 48kHz 192 kbps Frame0= 576 CRC 1 Emph 0 stereo	Layer2 48kHz 128 kbps Frame0= 384 CRC 0 Emph 0 j-stereo	Layer2 48kHz 256 kbps Frame0= 768 CRC 0 Emph 0 stereo	Layer2 48kHz 256 kbps Frame0= 768 CRC 0 Emph 0 stereo	Layer2 48kHz 256 kbps Frame0= 768 CRC 0 Emph 0 stereo	
dynamically RDS data							
PI-Code	---	---	---	---	---	---	
PS-Name	*TOP_40*	---	---	HITRADIO	---	harmony	
Radiotext	Dein offizieller Sounddealer !	---	---	06:49Uhr News: Hoesbach Stauge-fahr wg. Unfall	planet-fon 01805-978 3000 planet more music radio	harmony.fm Hoerertelefon 06101-985000	

Information		
Error memory	empty	
Temperature	38 °C	
Device number	0210090	
Device index	00	

Update Back

ASI channel	shows the ASI channel (1 or 2) currently in use
Status	synchronisation status
Data rate	data rate of ASI channel
Actual data proportion	…of which actual data constitute …%
TS-ID	shows theTS-ID
FM channel	shows the details for the FM output channel(s) (1 to 6)
Output frequency	shown in kHz
Audio status	audio status information
Dynamic RDS data	
PI-Code	shows the sender's PI code as contained in the data stream
PS-Name	shows the service name as contained in the data stream
Radio text	shows the radio text as contained in the data stream
Information	
Error memory	shows the errors arising in internal communication between the controllers
Temperature	temperature of terminals board
Device number	shows the device number
Device index	shows the device index

8.8 Softwareversion (Menü 8)

ASI-AUDIO TRANSMODULATOR, ATR 221
(9860.01 / 00), Address 00 / 00

Version	
AP-Controller	9860.01-81.01 Steuercontroller Anschluß-LP V1.03 18.09.2008 JR
TS-Manager	9085.01-88.03 TS_Aufbereitung V1.02 18.09.08 SS
UKW-Bootcontroller	9085.01-88.01 UKW-FPGA download Ctrl(1) V1.01 09.09.08 JR
UKW-Modulator-FPGA	9085.01-87.01 6x UKW modulator V1.01 25.08.2008 PK
RDS-Encoder	9085.01-90.01 RDS-Encoder V1.02 16.09.2008 JR
MPEG-Decoder	9085.01-88.02 MPEG-Decoder V0.01 23.05.2008 SS
ASI-Bootcontroller	9850.02-88.01 FPGA Download Controller V1.33 15.07.2008 MF,PK
ASI-FPGA	9850.02-87.01 ASI Input FPGA V1.40 11.06.2008 MF,WE

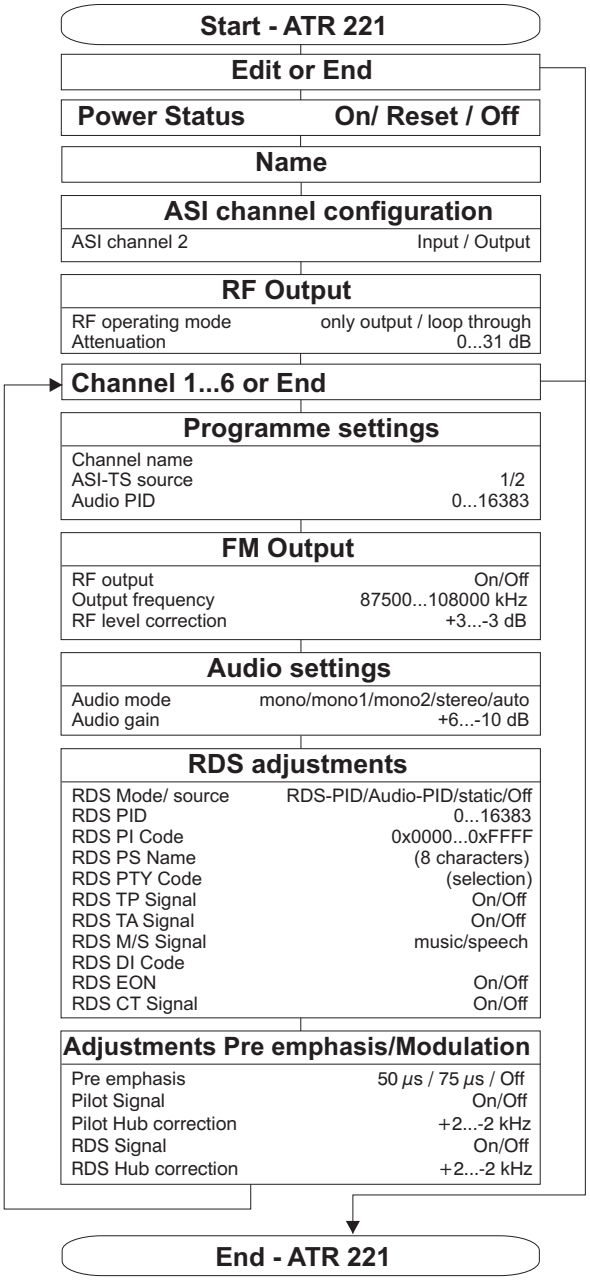
Update Back

Name of device, item number, address in headend

Software versions
Shows the software versions for the controllers as follows:

- Controller of terminals board
- Transport stream manager
- Boot controller for the VHF modulator FPGA
- VHF modulator FPGA
- RDS encoder
- MPEG decoder
- Boot controller for FPGA of input ASI
- FPGA for input ASI

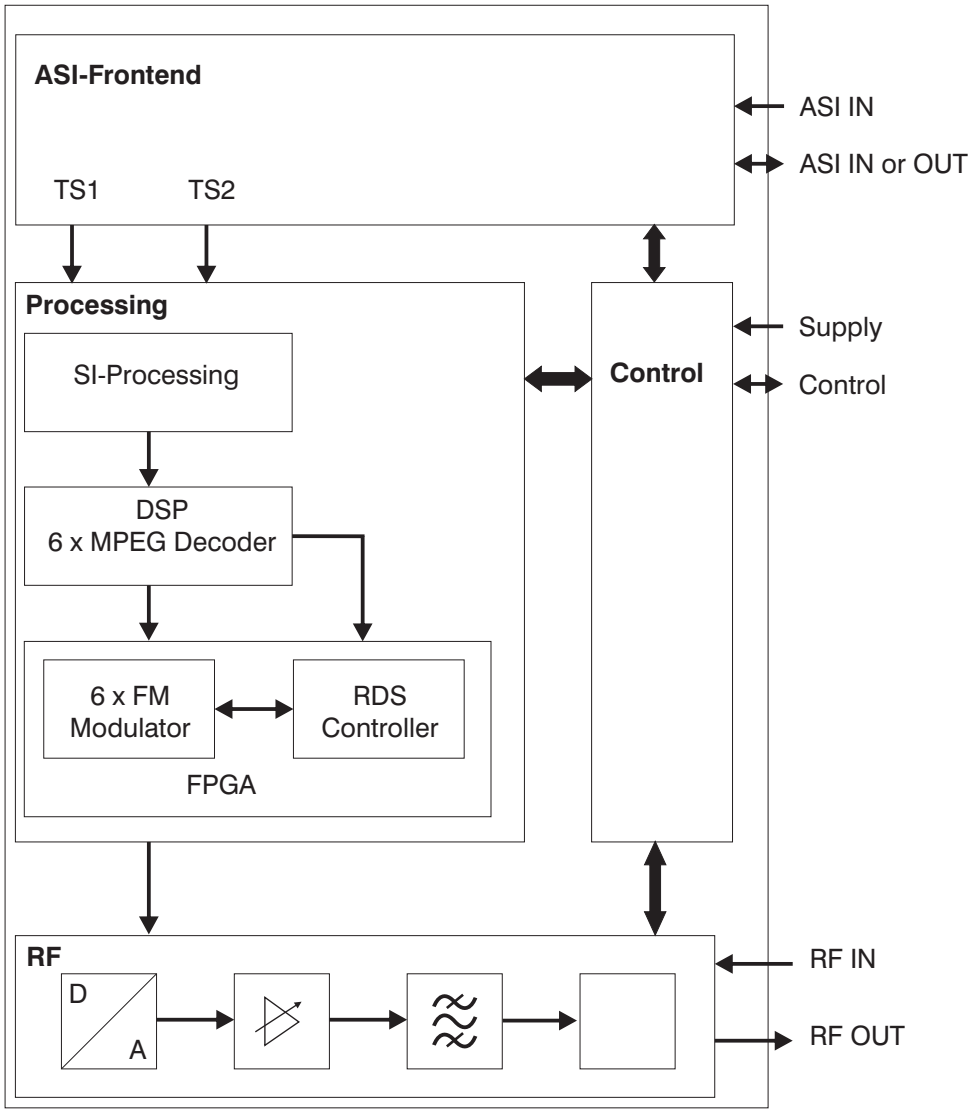
9. Manual menu control at the Headend Controller (HCB 100)



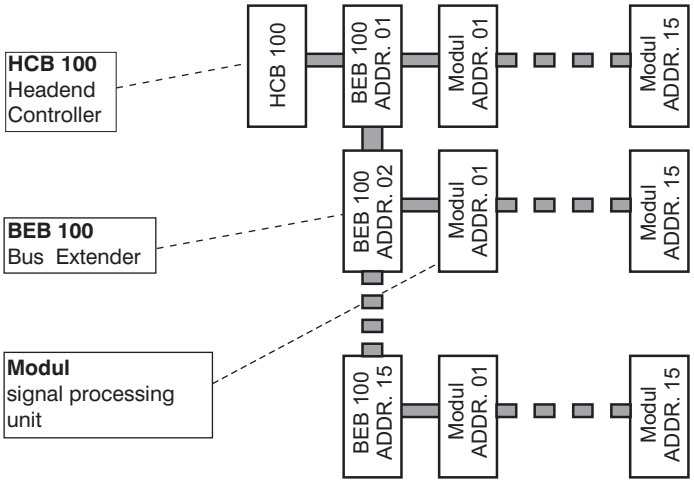
10. Trap messages

Serial no.	Message	Type	Notes
01	Signal OK	INFORMATION	Modul works correct
02	Input not sync	WARNING	Input not synchronized
03	MPEG: Open Error	CRITICAL	Access error MPEG-Decoder
04	System reset	WARNING	Reset after intern error
05	MPEG-Decoder not sync	WARNING	MPEG-Decoder not synchronized
06	Power fail	CRITICAL	Error on supply voltage
07	MPEG-Decoder sync	INFORMATION	MPEG-Decoder synchronized
08	ATMEGA: Open Error	CRITICAL	Access error FM-Boot controller
09	NIOS: Open Error	CRITICAL	Access error RDS-Encoder

11. Block diagram

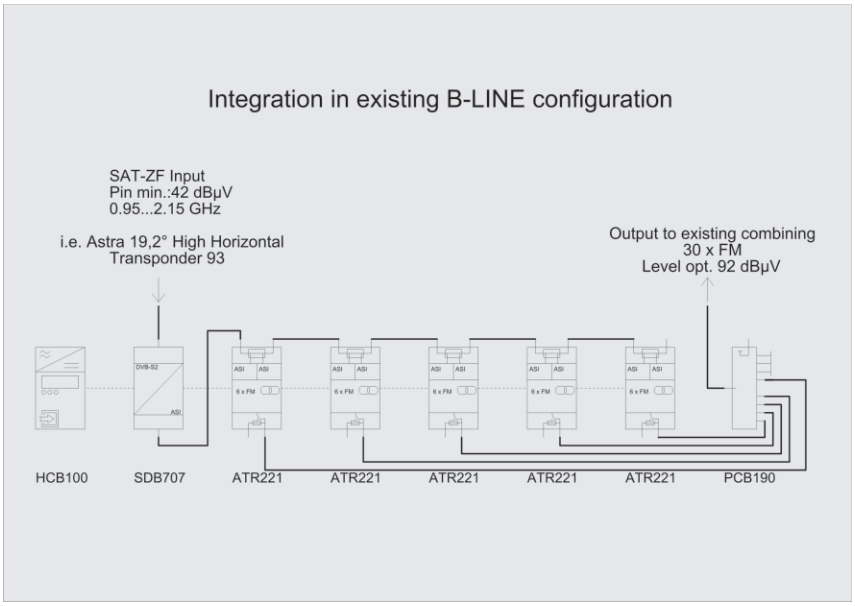


12. Headend BUS structure



The number of the possible module connections (00 ... 15) to a BEB 100 depends on the total power consumption of this line!

13. Example of use



14. Technical data

ASI Input

Level range	200 … 880 mV_{pp}
Data rate	270 Mbps
Connector type	BNC socket
Impedance	75
ASI - Polarity	regular / inverted

ASI Output

Level	800 mV_{pp} ± 10%
Data rate	270 Mbps
Connector type	BNC socket
Impedance	75
ASI - Polarity	normal

ASI - Signal processing

Data rate	0.625 … 78 Mbps
ASI - Transmission format	
Input	continuous, burst
Output	burst
TS - Transmission format	
Input	188, 204 Byte
Output	188, 204 Byte
Signal processing	EN 50083-9 [1]

FM-Modulator / FM Output

Max. FM-deviation	75 kHz
NF-level range (deviation correction)	-10…+6 dB
Frequency range	87.5…108 MHz
Frequency step	50 kHz
Output impedance	75
Output return loss	> 16 dB
Amplitude response 40 Hz...15 kHz, reference: 400 Hz, preemphase 50 µs	< ± 0.5 dB
Rejection of modulation frequencies between 18.9…19.1 kHz and 23…100 kHz	> 40 dB
Total harmonic distortion	
40 Hz…15 kHz at 40 kHz deviation	> 66 dB bei 400 Hz
40 Hz…15 kHz at 75 kHz deviation	> 60 dB bei 400 Hz
Difference tone attenuation D2 between 40 Hz…15 kHz	> 70 dB
SNR weighted (Pre- und Deemphase 50 µs, R, L)	> 66 dB (Quasi-Peak-Detector, CCIR weighted)
SNR unweighted (Pre- and Deemphase 50 µs, R, L)	> 72 dB (Quasi-Peak-Detector, CCIR unweighted)
Crosstalk attenuation between	
40 Hz…100 Hz	> 38 dB (- 26 dBFS)
100 Hz…15 kHz	> 40 dB (- 26 dBFS)
Output frequency inaccuracy after 24 hours at 25 °C	< ± 2 kHz
Temperature depended frequency inaccuracy	< ± 2 kHz
Spurios between	
47…87.5 MHz and 111…862 MHz	64 dB
87.5…111 MHz	60 dB
Frequency error	< 3 kHz
Output level (switchable)	
direct output (without directional coupler)	max. 6 x 110 dBµV
with directional coupler	max. 6 x 100 dBµV
Total level	1 dB (0…31 dB)
Individual level	0.5 dB (± 3 dB)
Connector	F socket

Stereo – Coder

Processing	Multiplex, CCIR
Deviation pilot	6.7 kHz

RDS – Coder

Processing	EN 62106:2001 [2]
Deviation	2.4 kHz
Supported services	PS, PTY, TP, TA, EON, PI, RT, MS, CT, DI

Operating parameters

Current / voltage	12 V (± 0.2 V) / 750 mA
Residual ripple of supply voltage	10 mV_{pp}

Enviromental conditions

Temperature range	-10 ... +55 °C
Temperature range (for data keeping)	5 ... 45 °C
Relative humidity	80 % (non condensing)
Method of mounting	vertical
Location of mounting	splash-proof and drip-proof

Physical information

Dimensions (l x w x h)	
without 19" - adapter	50 x 276 x 148 mm
with 19" - adapter	50 x 301 x 148 mm
Weight	1,200 g

Delivery content

1 x BUS -connector
1 x F connecting cable 140 mm

15. Glossary

AM	**A**mplitude **m**odulation
AP	**A**nschluss**p**latte (Terminals board)
ASI	**A**synchronus **S**erial **I**nterface
ATV	**A**nalog **T**ele**v**ision
AV	**A**udio/**V**ideo
CCIR	**C**omité **C**onsultatif **I**nternational **R**adiocommunication
C/N	**C**arrier **t**o **N**oise ratio
CT	**C**lock **T**ime
D/A	**D**igital/**A**nalog
DI	**D**ecoder-**I**dentifications-Control code
DSP	**D**igitaler **S**ignal **p**rocessor
DVB	**D**igital **V**ideo **B**roadcasting (-C Cable, -S Satellit, -S2 Satellite 2)
EON	**E**nhanced **o**ther **N**etwork
ETSI	**E**uropean **T**elecommunications **S**tandards **I**nstitute
FIFO	**F**irst **I**n – **F**irst **O**ut
FM	**F**requency **m**odulation
FPGA	**F**ield **P**rogrammable **G**ate **A**rray
HE	**H**ead**e**nd
HF	**H**igh **f**requency
http	**h**yper**t**ext **t**ransfer **p**rotocol
ID	**Id**entifier
IIC	**I**nter-**I**ntegrated **C**ircuit
IP	**I**nternet **P**rotocol
LED	**L**ight **E**mitting **D**iode
MC	**M**icro**C**ontroller
MIB	**M**anagement **I**nformation **B**ase
MPEG	**M**oving **P**icture **E**xperts **G**roup
NIM	**N**etwork **I**nterface **M**odule
PCR	**P**rogram **C**lock **R**eference
PI	**P**rogram **I**dentification
PID	**P**rogram **Id**entifier
PLL	**P**hase **L**ocked **L**oop
PMT	**P**rogram **M**ap **T**able
PS	**P**rogram **S**ervice **N**ame
PTY	**P**rogram **Ty**pe
RDS	**R**adio **D**ata **S**ystem
RF	**R**adio **F**requency
RT	**R**adio **T**ext
SNMP	**S**ingle **N**etwork **M**anagement **P**rotocol
SPI	**S**erial **P**eripheral **I**nterface
TA	**T**raffic **A**nnouncement
TP	**T**raffic **p**rogram
TS	**T**ransport **s**tream

16. Bibliography

[1] EN 50083-9: Cabled distribution systems for television, sound and interactive multimedia signals, part 9: Interfaces for CATV/SMATV headends and similar professional equipment for DVB/MPEG-2 transport streams

[2] EN 62106:2001 : Specification of the radio data system (RDS) for VHF/FM sound broadcasting in the frequency range from 87.5 to 108.0 MHz (IEC 62106:2000); German version

[3] EN 50083-1: Cabled distribution systems for television, sound and interactive multimedia signals, safety requirements

17. History

Version	Date	Modification	Editor
1.00	28.10.2008	Basic document	Häußer, Poch

Options and other TV standards available upon request! Changes due to technical progress possible!

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